Appendix 11c-J: Documentation of NO_x Point Source Growth From 1990-1999

To: Bill Gill

From: Kathy Pendleton

Subject: Calculation of NOx Emission Change From Survey Data

Date: April 9, 1998

With the 1996 inventory update request, the E.I. section mailed 497 survey forms to the four nonattainment areas. The survey forms were sent to companies that were in the inventory for 1990 and 1996. The intent of the survey was to determine the cause of emissions change between the two inventory years. The forms listed the NOx and VOC emissions reported from each company for 1990 and requested the company to include their 1996 emissions and state the reason for any change in emissions. The reasons for the change were listed as emission factor change, calculation methodology change, control device added, process change, added leaking fugitive inspection plan (VOC only), equipment shutdown or startup, and different operating rates.

Of the 497 forms sent out statewide, 267 were received. For the Houston/Galveston (H/G) area, 290 forms were sent out and 142 were received for a 53% response rate for this area. The reasons for the change were reviewed to determine "paper" or non-real changes versus actual emissions changes. These numbers were compared with the actual reductions between the two years. The emissions change are summarized below:

Inventory	H/G Total (tpy)	Survey Population (tpy)
1990	272,341[1]	148,843.7
1996 (prelim)	212,943	106,950.7

The difference in emissions between the two years are summarized:

Difference ('90-'96)	H/G Total	Survey Population
Actual (tpy)	59,398	41,893.0
percentage change (%)	- 21.81	- 28.15

From these tables, I note that a significant percentage of the emissions are covered by this survey in the Houston/Galveston area but the reported changes are larger in the survey population than in the Houston/Galveston area as a whole.

The reasons for the changes were categorized as "real" or "paper". The changes in emissions due to different emissions factors and calculation methodology changes were considered "paper". All other

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[1]The 267,491 tpy of point source NO_x emissions, as submitted in the 1990 base year emission inventory (adopted October 27, 1993) is adjusted by the addition of 4850 tpy from account number GB-0153-Q, as discussed in footnote 1 of the NO_x RACT reductions table in Appendix 11c-K of this SIP.

changes are considered as change reasons that actually affected emissions.
Forty-five percent of the 41,893 tons reported as changed in the survey population were due to "paper changes". The other reasons break down as follows:

Change Between 90 and 96 (Survey Results)	Amount (tpy)	Change (Amount/41,893) (%)
Control Devices Added	-1731.7	-4.13
Process Changes	-1042.6	-2.49
Equipment Shutdown	-2661.0	-6.35
Equipment Startup	+419.0	+1
Operating Rates	-13993.7	-33.4

Because the data we collected is based on actual data as reported by a significant percentage of the companies in the Houston/Galveston area, it is desired to use the data to predict emissions trends for the 1996 to 1999 time period. Each reason for the emission change was evaluated as to whether it could be expected to continue for the next 3 years.

Change	Discussion	Count Trend for 96-99?
Control Devices Added	Past changes were not a result of rule making. Future rule making will result in changes and reductions should be accounted for in that manner	No
Process Changes	Will rule making allow process changes or force process changes to gain reductions? If yes, then those changes should be accounted for in that category. Otherwise, companies may still seek these to gain process efficiency. But I suspect that the larger emitting sources have already found the changes that are easiest to obtain so trend cannot be counted on to continue.	No
Equipment Shutdown/Startup	This is a regular part of doing business. Equipment gets antiquated and is shutdown or additional capacity is sought. Older equipment is likely to be of higher emitting types than newer equipment	Yes
Operating Rates	These are probably a result of actual business trends and it is not possible to state that these trends will continue as before	No.

The only items believed to continue the experienced trend are equipment startups and shutdowns. Combined, these reasons total 2,241 tons of the 41,893 ton per year reduction in the surveyed emissions. This amount is a 5.35% reduction in the surveyed emission due to these changes. Since the survey emissions changes are greater than the total inventory changes, this change is first applied to the inventory change, rather than the total inventory. Applying this percentage to the 1990-1996 inventory percentage change, 5.35% of 21.81% is 1.17%. Since we are projecting this level of change for three years (1996 - 1999) rather than six (the period of the survey), the percentage reductions from startups and shutdowns for the 1996 to 1999 period is expected to be half, or 0.58%.

cc: Paul Henry
Jim Thomas
Paul Brochi
Liz Hendler

Projecting the 1999 Inventory of Point Source NO_x Emissions by
Applying Growth Factors to the 1990 Base Year Inventory

This is a two-step process. First, the observed growth between the 1990 and the 1996 annual emissions are considered. Second, the projected growth from the 1996 annual emissions to 1999 annual emissions is developed.

1. Growth from 1990 to 1996. The growth, or change, from 1990 to 1996 is based on comparison of actual inventories. In April, 1998, data was available from both the 1990 and 1996 Emissions Inventories (EI), and an accompanying survey regarding the amount and reasons for emissions change. This enables a direct analysis of the change.

As discussed in the April 9, 1998 memo from Kathy Pendleton, the "paper" change is excluded from the growth calculation because this type of change does not reflect change in what was actually emitted. The remaining 45% of the change reflects actual observed change, and is included in the growth factor from 1990 to 1996:

Growth factor from 1990 to 1996 = - 21.81% total EI change (0.45 non-paper change)

\- 9.81%

2. Growth from 1996 to 1999. Since this period involves extrapolation into the future, the estimate is calculated on a more conservative basis than the 1990 to 1996 estimate. Emission reductions caused by changes in activity levels, addition of control devices, and changes to processes are excluded. From the memo from Kathy Pendleton:

Growth factor from 1996 to 1999 = - 0.58%

The total growth factor 1990-1999 is the sum of growth over the two periods:

Growth factor from 1990 to 1999 = - 9.81% + - 0.58%

= **- 10.39%**

Thus the projected 1999 inventory is:

1999 Projected NO_x Point Source Inventory = 794.85 tpd (1 - .1039) = **712.27 tpd**

Due to the length, the appendices associated with this report are not available in electronic file.

Please contact Eve Hou, (512) 239-5838 or ehou@tceq.state.tx.us, of the TCEQ to attain a hardcopy version.